梅崎 勇*: 日本産海藻ノート (1)

Isamu UMEZAKI*: Notes on some marine algae from Japan (1)

1. **Chaetomorpha brachygona** Harvey *Chaetomorpha brachygona* has been found growing on rocks in the littoral belt in Wakasa Bay. The filaments are irregularly curved, forming an entangled mass with a diameter of up to 50 cm. They measure from 75 μ to 180 μ in diameter. The cells of the filament vary in length from 60 μ to 390 μ, and may be $^1/_2$ to 3 times as long as the diameter, and slightly constricted or not at their joints. Larger cells, which may produce zoosporangia when mature, are formed at irregular intervals throughout the length of a filament. Y. Yamada (Studien über die Meeresalgen von der Insel Formosa, in Bot. Mag., Tokyo **39**: 88, 1925) reported this species from Formosa in 1925, but it has not, until now, been recorded for the Japanese marine flora. This report extends the distribution of the species northward in the Asian Pacific. The present specimens from Wakasa Bay resemble very well those of Y. Yamada's collection from Formosa (Herb., Fac. Sci., Hokkaido Univ., at Sapporo) and that of a collection by H. L. Blomquist and L. R. Almodovar from Mayaguez, Puerto Rico (Marine Algae of Puerto Rico, Institute of Marine Biology, University of Puerto Rico, no. 3166).

The writer is greatly indebted to Emeritus Professor Y. Yamada of Hokkaido University for his kind permission to make free use of his collections and to Dr. L. R. Almodovar of Puerto Rico for sending his collections.

Habitat and locality: On rocks in the littoral belt. Takahama, Fukui Pref. *Umezaki 2830*, leg. Umezaki, 23 Aug. 1961.

2. **Blastophysa rhizopus** Reinke *Blastophysa rhizopus* was reported as occurring in the thalli of *Neodilsea yendoana*, *Grateloupia tsurutsuru* and *Schizymenia dubyi* in 1948 by J. Tokida and T. Masaki (On green-spot disease of *Neodilsea yendoana* Tokida, in Hokusuishi Geppô **5** (6): 14–17, 1948), who in their report proposed that heavy endophytism of the green alga in its host plants be called "green-spot disease". Similar observations have been made on the thalli of *Pachymeniopsis lanceolata* and *Schizymenia dubyi* collected from several localities of Japan. The plant vesicles of *Blastophysa rhizopus* are irregular in shape, oval or

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oval acuminate, and measure 50-230μ in size. They bear usually two or three long, colorless tubes by which several emptied vesicles are sometimes jointed. The chromatophores, each with a single central pyrenoid, are angular in surface view, forming a reticulum. Numerous daughter cells each of which appears to develop into a new plant after liberation have been found within several mother vesicles. The daughter cells may be germlings from swarmers such as zoospores or gametes, though these have not been observed in the present study. (Fig. 1).

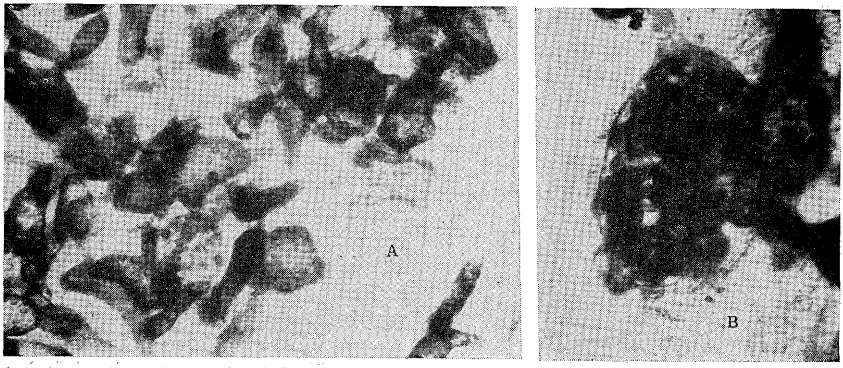

Fig. 1. *Blastophysa rhizopus* Reinke. A. individual vesicles detached from their host plant. ×60. B. daughter cells in mother vesicle. ×300.

Habitat and locality: Endophytic in *Schizymenia dubyi* (Chauv.) J. Ag. O-shima off Wagu, Shima Peninsula, Mie Pref. *Umezaki 3027*, *3039*, leg. Umezaki, 10 Jun. 1952. Kamakura, Kanagawa Pref. *Umezaki 3079*, leg. Yamamoto, 20 Jun. 1959. Mikuni, Fukui Pref. *Umezaki 3030*, leg. Umezaki, 2 Jul. 1962. Sanbon-matsuhana, Maizuru Bay, Kyoto Pref. *Umezaki 3368*, leg. Umezaki, 31 Jul. 1963. In *Pachymeniopsis lanceolata* (Okam.) Yamada. Tannowa, near Wakayama. *Umezaki 3259*, leg. Umezaki, 8 Jul. 1963.

3. **Schimmelmannia plumosa** (Setchell) Abbott The genus *Baylesia* was established by W. A. Setchell (Algae novae et minus cognitae I, in Univ. Calif. Publ. Bot. **4**: 249, 1912) in 1912, based on the type species *B. plumosa* from Pacific Grove, California and was placed in the Dumontiaceae. H. Kylin also placed it in the same family in his "Die Gattungen der Rhodophyceen" (1956, p. 152).

In Japan, K. Okamura had illustrated and described the species in his "Icones of Japanese Algae" (**5**: 167, pl. 145, 1927). Okamura's specimen was identified as a species of *Baylesia* by W. A. Setchell in 1926, when he visited Okamura's

laboratory on the occasion of the 3rd Pan-Pacific Congress held in Tokyo. S. Segawa (The development of the female reproductive organs in Nagaobane (*Baylesia plumosa* Setchell), in Bot. & Zool. **6**: 1987–1990, 1938), studying the development of carposporophyte of this species, had preliminarily suggested that the species should be placed in the Gloiosiphoniaceae near *Schimmelmannia*. More recently, I. A. Abbott (On *Schimmelmannia* from California and Japan, in Pacific Naturalist **2** (7): 3–8, pls. 1–2, 1961) has transfered it from the Dumontiaceae to *Schimmelmannia* in the Gloiosiphoniaceae.

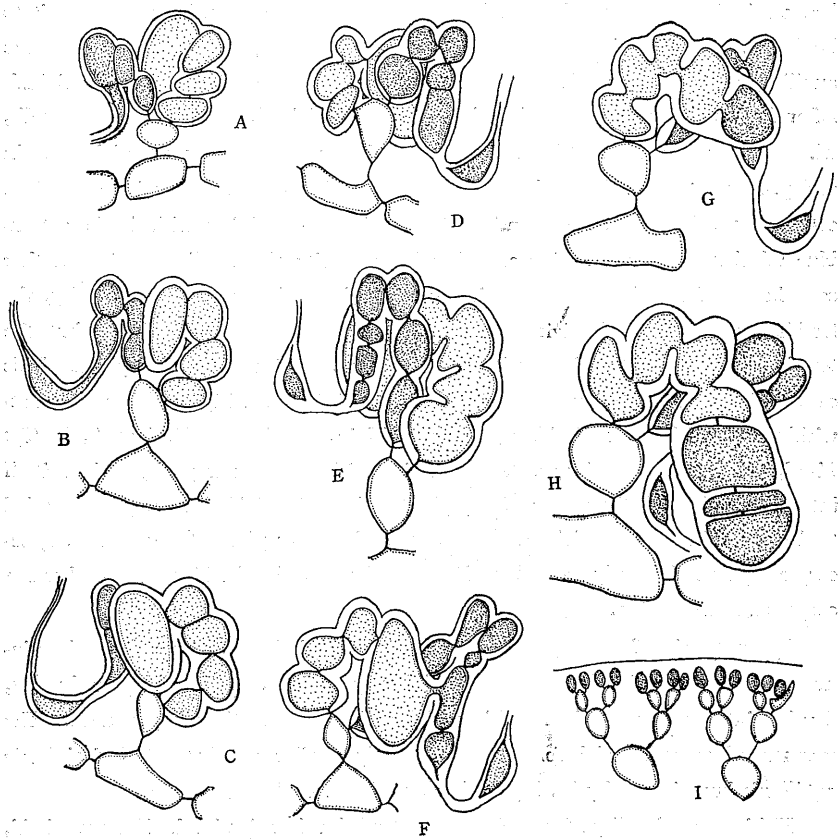

Fig. 2. *Schimmelmannia plumosa* (Setchell) Abbott. A, B. procarp before fertilization. C. procarp after fertilization. D. the first division of carpogonium. E. three cells after the second division of carpogonium. F. fusion of connecting cell with auxiliary cell. G. development of the first gonimoblast. H. development of three gonimoblast cells. I. part of cortex in cross section, showing spermatangia. A—I. ×400.

The writer has collected it from Wakasa Bay where it is rare. He reinvestigated developmental processes of the female and male reporductive organs of the alga and found that the conclusions of Okamura, Segawa and Abbott could be confirmed.

A unique character of *Schimmelmannia* is to bear both carpogonial branch and auxiliary cell branch on the same supporting cell. A carpogonial branch is formed before the auxiliary cell branch. An auxiliary cell branch is usually composed of four cells of which terminal one becomes the auxiliary cell. Two procarps are never formed together on the same supporting cell. A carpogonial branch is four- or five-celled. Abbott and Segawa, however, have reported it to be four and four to six cells, respectively. As the carpogonial branch matures the auxiliary cell gradually enlarges and becomes larger several times than the original. After fertilization the carpogonium is transversely divided, resulting in two cells, whose upper one is a little larger than the lower. The upper cell divides again and produces three cells of which the middle one becomes a connecting cell. The connecting cell shows a high density of protoplasm on staining with lactic cotton-blue solution. The connecting cell directly fuses with the auxiliary cell. Another case in the formation of connecting cell has been observed. Exceptionally, the fertilized carpogonium is divided into two cells, as was mentioned above, but the terminal one does not divide again but fuses directly with the auxiliary cell. This case is also seen in *Schimmelmannia ornata* studied by H. Kylin (Über die Entwicklungsgeschichte der Florideen, in Lunds Univ. Årsskr., N. F. Avd. 2, **26** (6): 14-16, 1930). The auxiliary cell, after fusing with a connecting cell, divides itself into two cells and the upper one of the two is again divided by a plane parallel to the first. Subsequent division takes place in irregular planes to produce a cystocarp composed of densely packed gonimoblast threads, all of which seem to become carpospores when ripe.

Spermatangia of the alga are borne from the apical cells of cortex in the pinnules. An apical cell of the cortex is obliquely divided. Both cells, rarely one, develop into a spermatangium within which a single spermatium is produced. The manner of spermatangial formation is exactly similar to that of *Gloiosiphonia capillaris* investigated by H. Kylin (l. c., p. 12, f. 4 G, 1930). (Fig. 2).

Habitat and locality: On rocks one meter below low tide level. Kanega-misaki, Maizuru Bay, Kyoto Pref. leg. Umezaki, 26 Jun. 1950; leg. Umezaki, 7 Jul. 1950; leg. Umezaki, 30 Jul. 1950.

4. **Nemastoma nakamurae** Yendo. *Nemastoma lancifolia* Okam., *N.*

foliacea Yamada and *N. nakamurae* Yendo are known from Japan. S. Kawashima (Notes on some marine algae from the northern Honshu, Japan (2), in Bull. Japan. Soc. Phycol. **5**: 68–70, 1957) has studied carposporophyte development of *N. lancifolia*, reporting that its mode was of the "Platoma-type". The writer has studied carposporophytes of *N. nakamurae*, from specimens from Wakasa Bay, and reached the conclusion that their developmental mode was much the same as that of *N. lancifolia* investigated by Kawashima. The developmental process is as follows: The carpogonial branch, composed of usually three, sometimes four cells whose apical one develops into a carpogonium, is laterally borne on a cell of inner cortical thread. The apex of the carpogonium elongates itself and then develops into a long trichogyne whose basal part is sometimes slightly curled though not so coiled as in *N. lancifolia* (see Kawashima, l. c.). The elongated trichogyne is slightly projected above the plant surface where it may receive spermatia. The trichogyne measures 5μ to 8μ broad. The carpogonium is a little smaller in size as compared with its hypogynous cell, measuring 6–7μ×5–6μ. The hypogynous cell becomes larger in size after fertilization. It is ellipsoidal or pear-shaped in side view. After fertilization the carpogonium produces from its side one to four connecting filaments. The filaments elongate themselves and are with or without cross walls, sometimes branching in dichotomous manner. An auxiliary cell is a directly transformed cell of the inner cortical layer. The elongated connecting

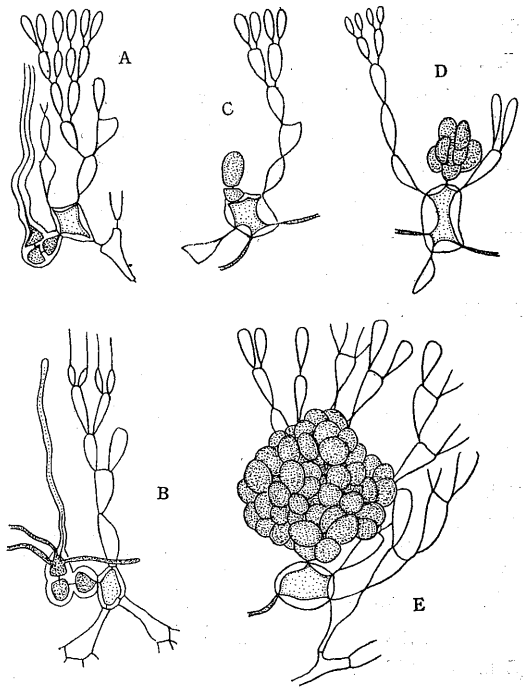

Fig. 3. *a Nemastoma nakamurae* Yendo
A. carpogonial branch before fertilization. B. showing three connecting filaments arose from carpogonium. C–E. showing three stages in gonimoblast development: C, D. gonimoblasts in early developmental stages; and E. mature cystocarp with carposporangia. A–E. ×300.

filament fuses usually with the lower, sometimes middle, part of an auxiliary cell. After connection with a connecting filament the auxiliary cell gradually increases its size and its protoplasmic contents become more dense. It is easy to distinguish from cortical cells by its larger size as well as by its more dense protoplasmic contents. The mature auxiliary cell may issue a new connecting filament which, after elongation may connect with another auxiliary cell. The gonimoblast initial is produced towards the plant surface on the apex or nearly apical side of the auxiliary cell and then its second and third divisions successively take place to produce two and three gonimoblast cells, most of which seem to develop into carpospores when ripe. The cystocarp thus formed is embedded among the threads of outer cortex.

The tetrasporangia are cruciately divided, bearing a size 15–25μ×30–45μ. The size is a little larger than the measurements of *N. lancifolia* given by Kawashima. (Fig. 3).

Habitat and locality: On rocks one meter below low tide level. Kato, Obama Bay, Fukui Pref. Leg. Umezaki, 7 Aug. 1950. Nagu, Maizuru Bay, Kyoto Pref. *Umezaki 3378*, leg. Inoue, 11 Aug. 1963.

All the specimens examined are deposited in the Herbarium, Department of Fisheries, Faculty of Agriculture, Kyoto University, Maizuru.

The wrighter wishes to express his sincere thanks to Dr. I. A. Abbott of Hopkins Marine Station for her kind criticism and reading of the manuscript.

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Yamada, Y. (1925) によって，台湾から報告された *Chaetomorpha brachygona* Harvey が，若狭湾高浜町海岸で発見された。日本新産種である。時田・正置 (1948) によって，北海道忍路より報告された *Blastophysa rhizopus* Reinke (アワミドリ) が，本州太平洋岸の数個所並びに日本海側の若狭湾からの *Schizymenia dubyi* (Chauv.) J. Ag. (ベニスナゴ) または *Pachymeniopsis lanceolata* (Okam.) Yamada (フダラク) に内生してみられた。アワミドリ植物体内に，恐らく，遊走子か配偶子か何れかの遊走細胞からの発芽体と思われる娘細胞が多数形成されてみられた。*Schimmelmannia plumosa* (Setchell) Abbott (ナガオバネ) の果胞子体と四分胞子嚢の発達段階が研究されたが，それは，岡村 (1927)，瀬川 (1938)，および Abbott, I. A. (1961) 等の結果と同じであった。しかし，連絡糸の形成方法に，別の型のものが観察された。*Nemastoma nakamurae* Yendo (ヒカゲノイト) の果胞子体と四分胞子嚢の発達過程が研究されたが，それは *Nemastoma lancifolia* Okam. (ウスギヌ) (川嶋，1957) と同じであった。